Use of a Net Environmental Benefits Analysis (NEBA) Approach For Remedial Decision Making at Two BRAC Sites

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Agenda

- Overview of Net Environmental Benefit Analysis (NEBA)
- Balancing Natural Resources and Remediation
- Two Case Studies
- Questions

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What is a NEBA?

- **Approach: Compare natural resource benefits of a management action (e.g., remedial action) versus natural resource costs**
- **Assist with risk management decisions**
- **Goals: assist in remedy selection to:**
  - **avoid creating unnecessary natural resource injury and;**
  - **encourage the selection of remedial options that offer the greatest benefit to the environment and public.**
- **Considers <u>both</u> natural resource and cleanup issues at a site**

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Why NEBA?

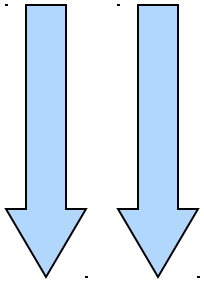
- **Balance of risks and benefits of remediation is ambiguous**
  - **site retains significant ecological value**
  - **remediation causes environmental damage**
  - **ecological risks are small, uncertain, or limited**
  - **remediation or restoration may fail**
- **Risks of remedy are rarely formally quantified**
- **How does the remediation affect the risk profile given the reuse scenario?**

Coordinated Approach to Assessment, Remediation and Restoration

Cleanup

Remedial Investigation
Health/Eco Risk Assessment
EE/CA, FS (NEBA)
ROD
Remedial Action
O&M

Parallel Track



NRI

Pre-Assessment
Assessment (e.g., injuries)
Post Assessment
(Restoration Options Analysis)
Restoration Plan (Consent Decree)
Restoration Implementation & Monitoring

Overall Goals

- Reduce study costs, improve design (e.g., eco-risk)
- Reduce time to resolution (transaction costs)
- Manage short and long-term risks
- Insure that remediation does not increase NRI
- Follow EPA/DOI Guidance (1999)

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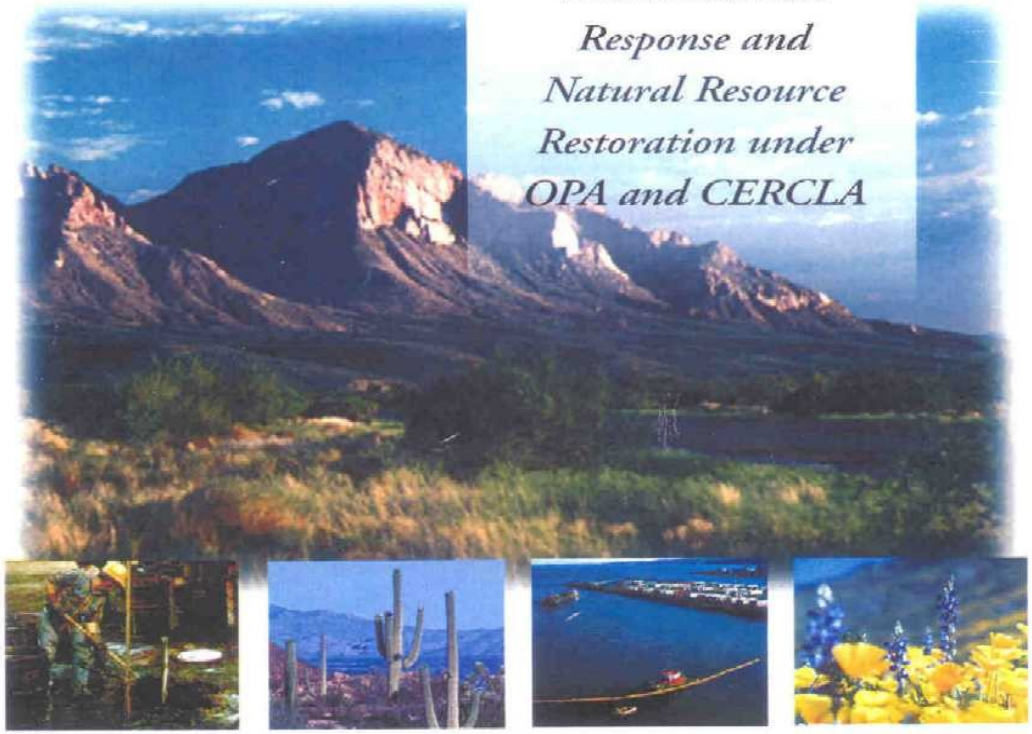
Reference Guide

Coordination of Environmental Response and Natural Resource Restoration under OPA and CERCLA



May 1999

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

150 U.S. Department of the Interior 1849•1999

"A Framework for Net Environmental Benefit Analysis For Remediation or Restoration of Contaminated Sites"

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USEPA National Center for Environmental Assessment

Manuscript Accepted by *Environmental Management*, To Be Published in 2004

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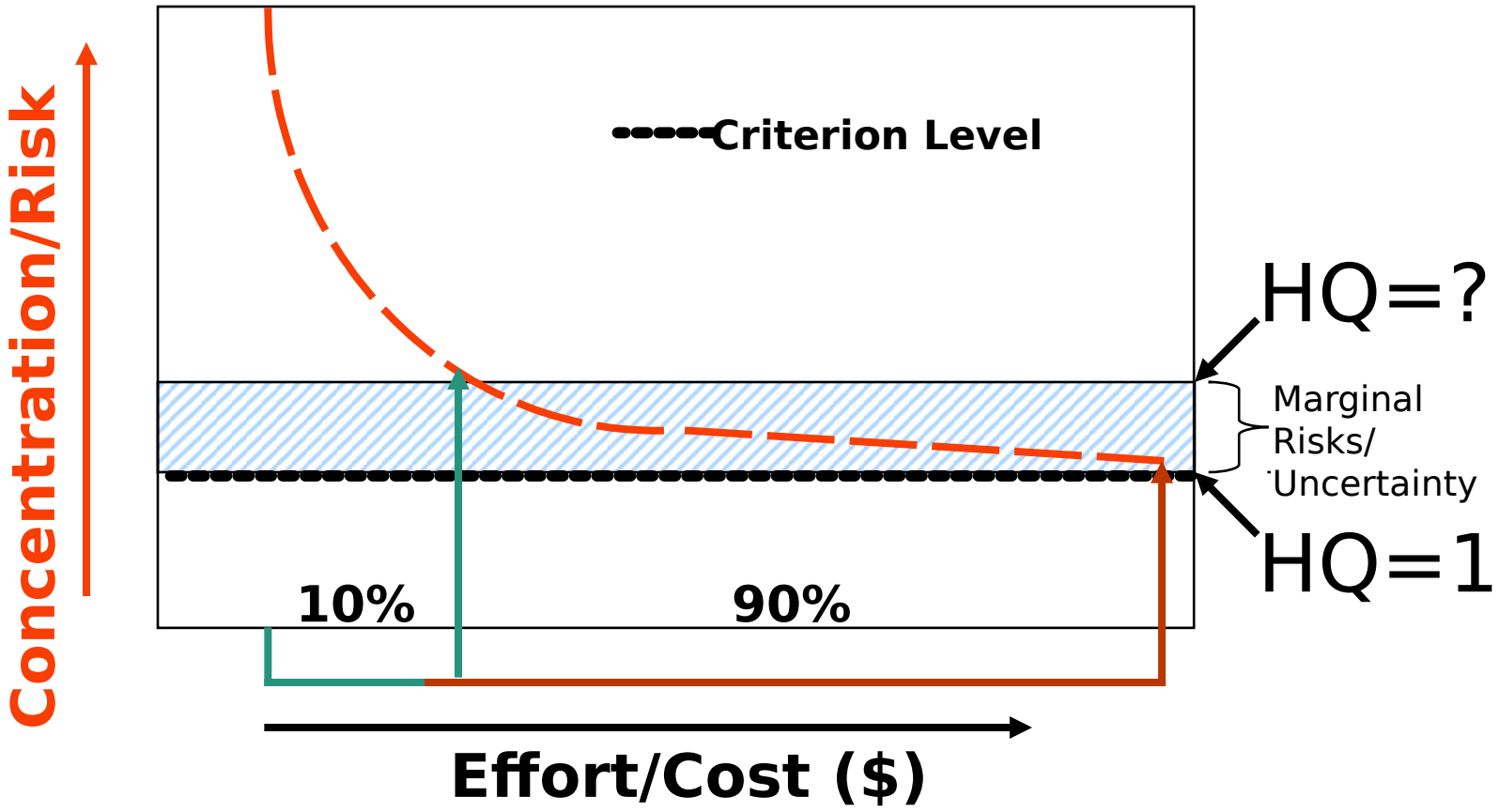
Cleanup to Criterion (Cost/Benefit)



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NEBA Approach

- **NEBA supplements ongoing framework, is not a replacement**
- **Given the interdependencies between remediation and land use, remedial alternatives are evaluated in conjunction with potential/likely reuse scenarios**
- **The general effect of each remedial/land use combination on the following parameters is evaluated:**
  - ***Ecological services (HEA Model),***
  - ***Human use values,***
  - ***Human risk profile,***
  - ***Ecological risk profile, and***
  - ***Cost***

Table 1. Overall Framework for Evaluation of NEBA Land Use Scenarios and Remedial Alternatives *(allows for comparison of how identified alternatives affect multiple parameters on an order of magnitude scale).*

Reuse Scenario #1					
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Remedial Alternative	***Ecological Services (dSAYs)***	***Human Use Value ($)***	***Human Risk Profile***	***Ecological Risk Profile***	***Cost ($)***
No Action					
Hot Spot Removal					
Soil Cover					
Complete Removal					

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NEBA At Two BRAC Sites

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DRAFT Results For BRAC Site 2 Summary Table, Parcel X

Net Environmental Benefits Analysis Summary Table							
		Ecological Services (DSAYs [1])	Human Use Service (net present value; millions of $)	Human Risk Profile (Chemicals)	Ecological Risk Profile (Chemicals)	Human Risk Profile (MEC)	Cost (millions of $)
	Parcel X						
	Institutional Controls	-55	0	Risk to FWS workers	Risk to some wildlife over 4.7 acres	MEC Risk present	1.5
Break Point	Limited Remediation	-94	0	No risk	Minimal residual risk	Negligible residual risk	8.7
	Removal	-1,608	-10.8	No risk	Minimal residual risk	Negligible residual risk	76.3
	Engineered Barrier	-3,069	-20.6	No risk	Minimal residual risk	Negligible residual risk	80.7

[1] DSAYs = Discounted Service Acre Years

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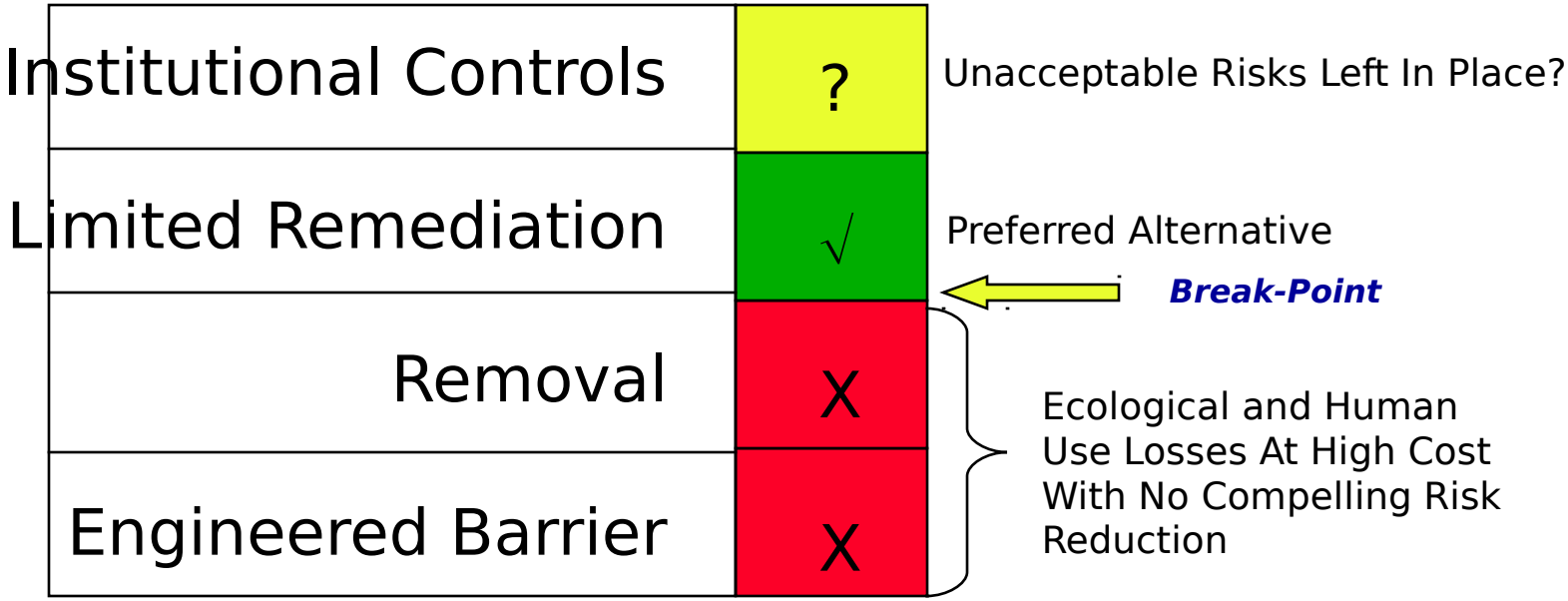
Integrated *Draft* Results for Parcel X Remedial Alternatives



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DRAFT Results For BRAC Site 2, Summary Table - Parcel Y

Net Environmental Benefits Analysis Summary Table							
		Ecological Services (DSAYs [1])	Human Use Service (net present value; millions of $)	Human Risk Profile (Chemicals)	Ecological Risk Profile (Chemicals)	Human Risk Profile (MEC)	Cost (millions of $)
	Parcel Y						
	Institutional Controls	0	0	No risk (assumed)	No risk (assumed)	Negligible risk likely	1.1
Break	MEC Surface Sweep (Forested Wetlands)	-62	0	No risk (assumed)	No risk (assumed)	Negligible residual risk	1.5
Point	MEC Clearance - 1 ft (Forested Wetlands)	-666	3.6	No risk (assumed)	No risk (assumed)	Negligible residual risk	4.6

[1] DSAYs = Discounted Service Acre Years

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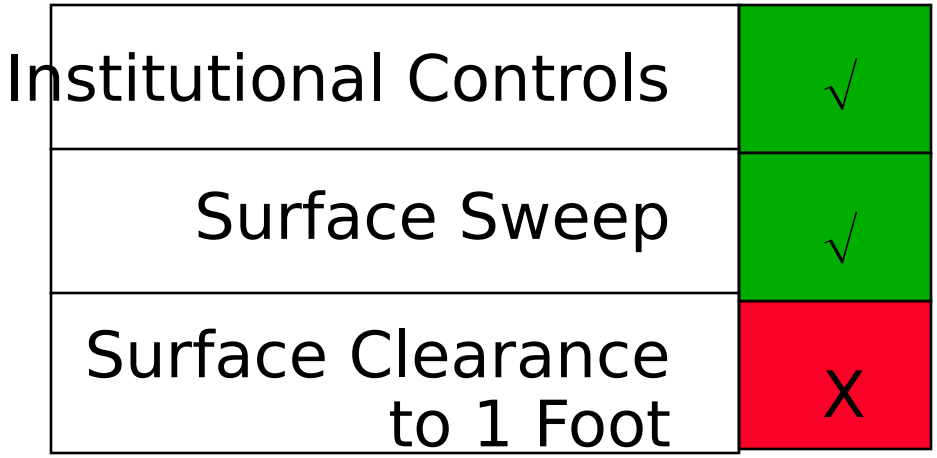
Integrated *Draft* Results for Parcel Y Remedial Alternatives



Acceptable

Preferred Alternative (may provide some level of comfort to the public in addressing potential human MEC exposure concerns)

Break-Point

Ecological and Human Use Losses At High Cost With No Compelling Risk Reduction

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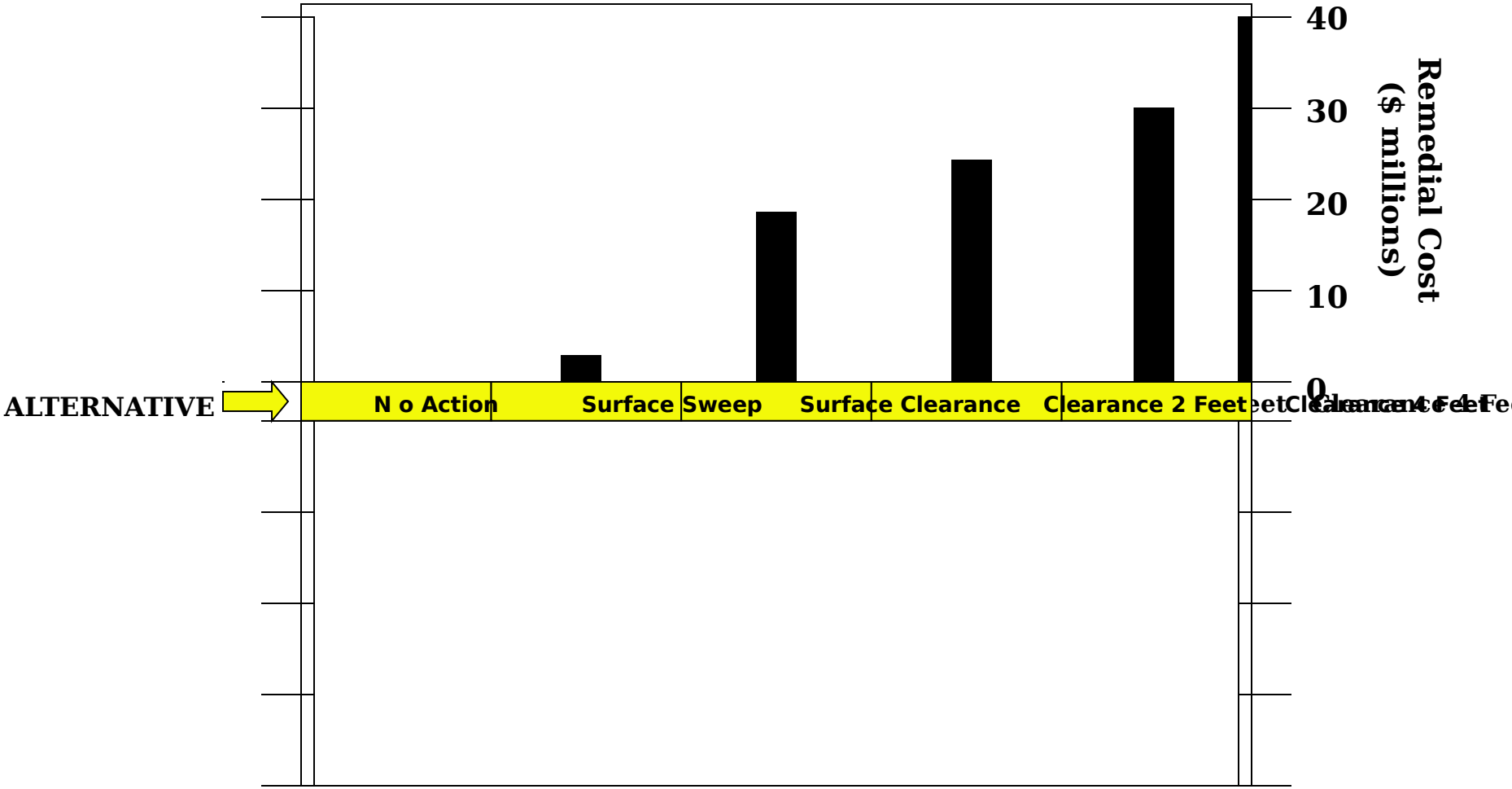
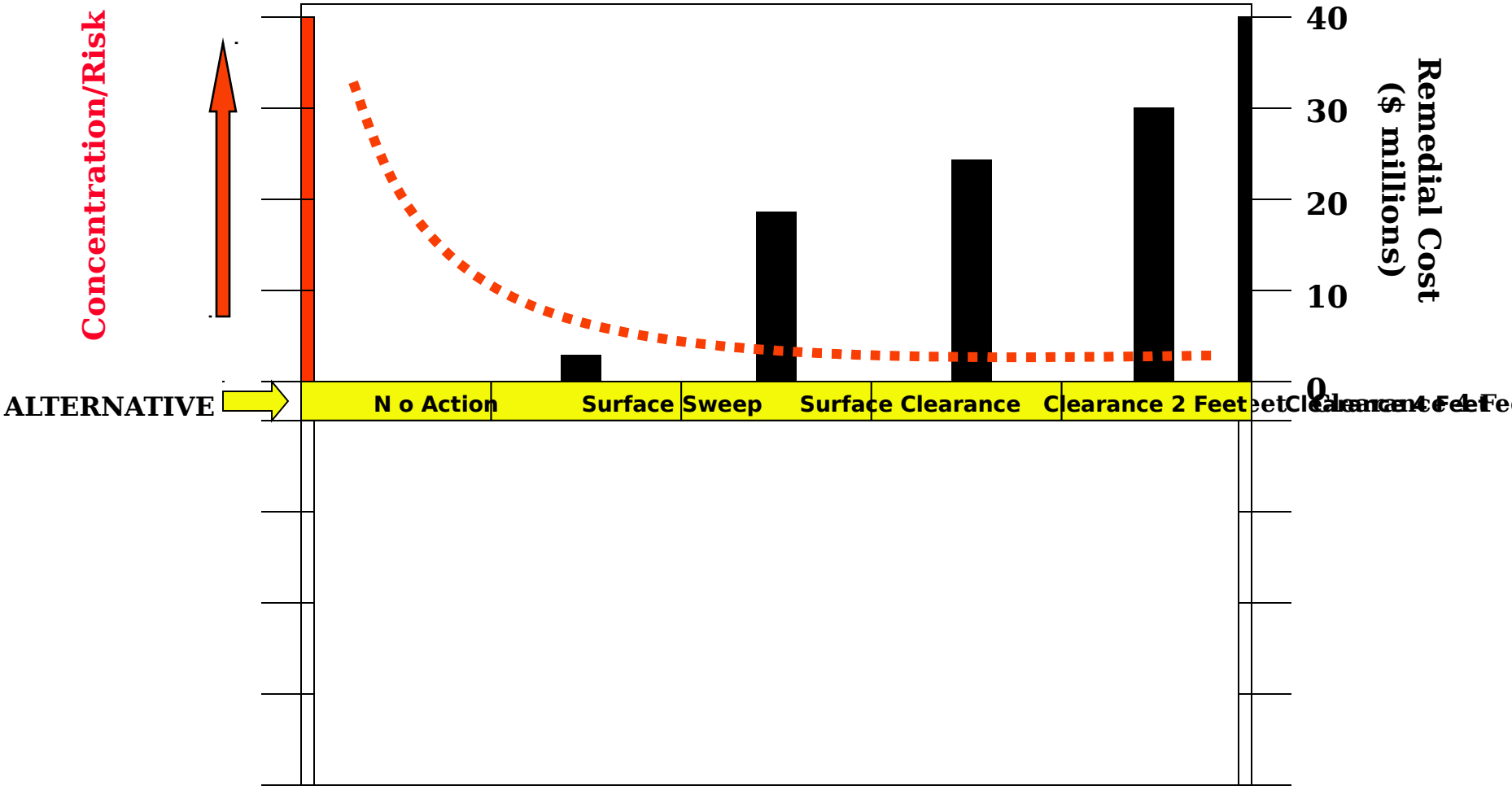
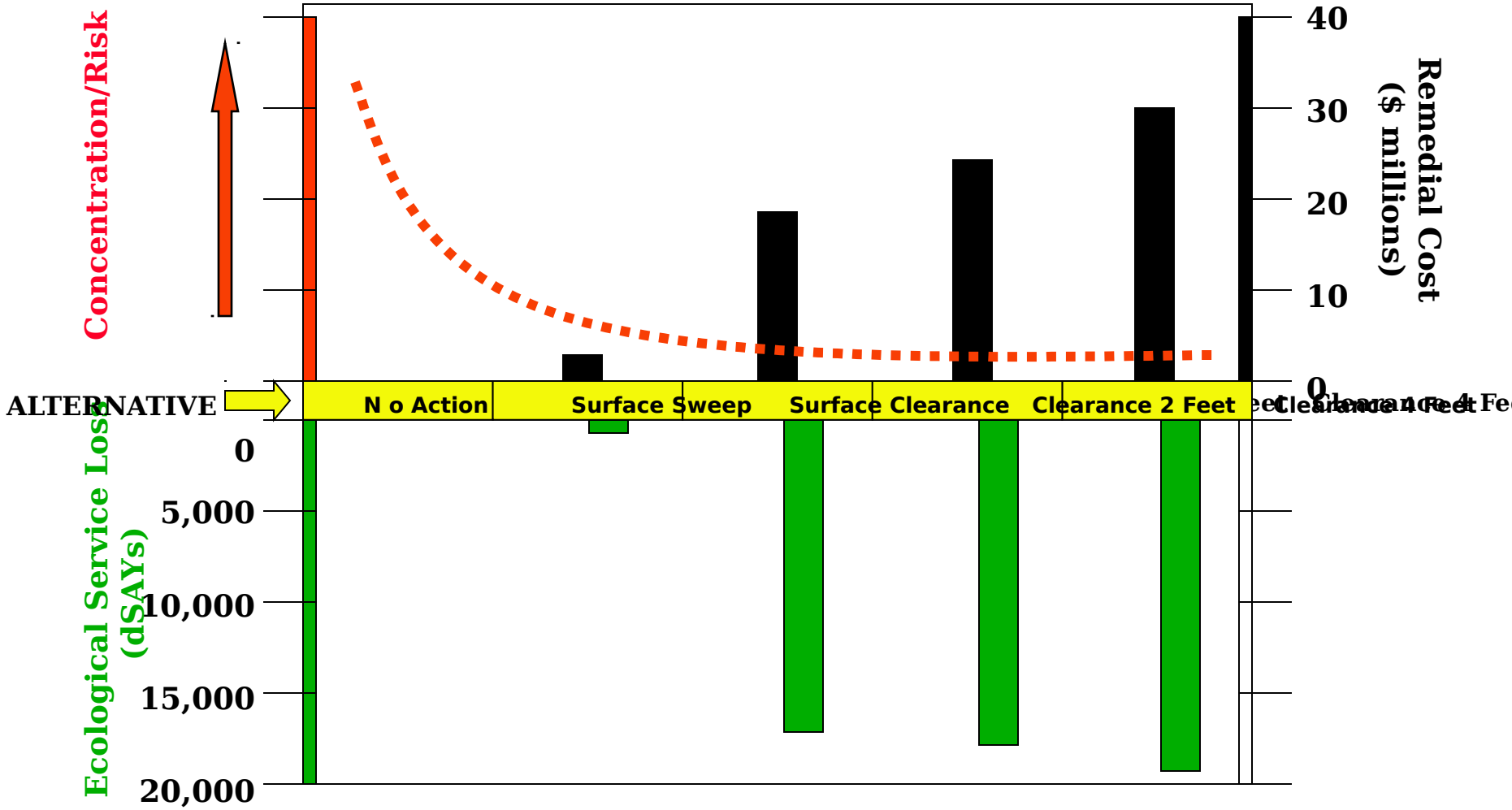
NEBA Results For BRAC Site 1: Comparison of remedial costs for each remedial alternative evaluated.



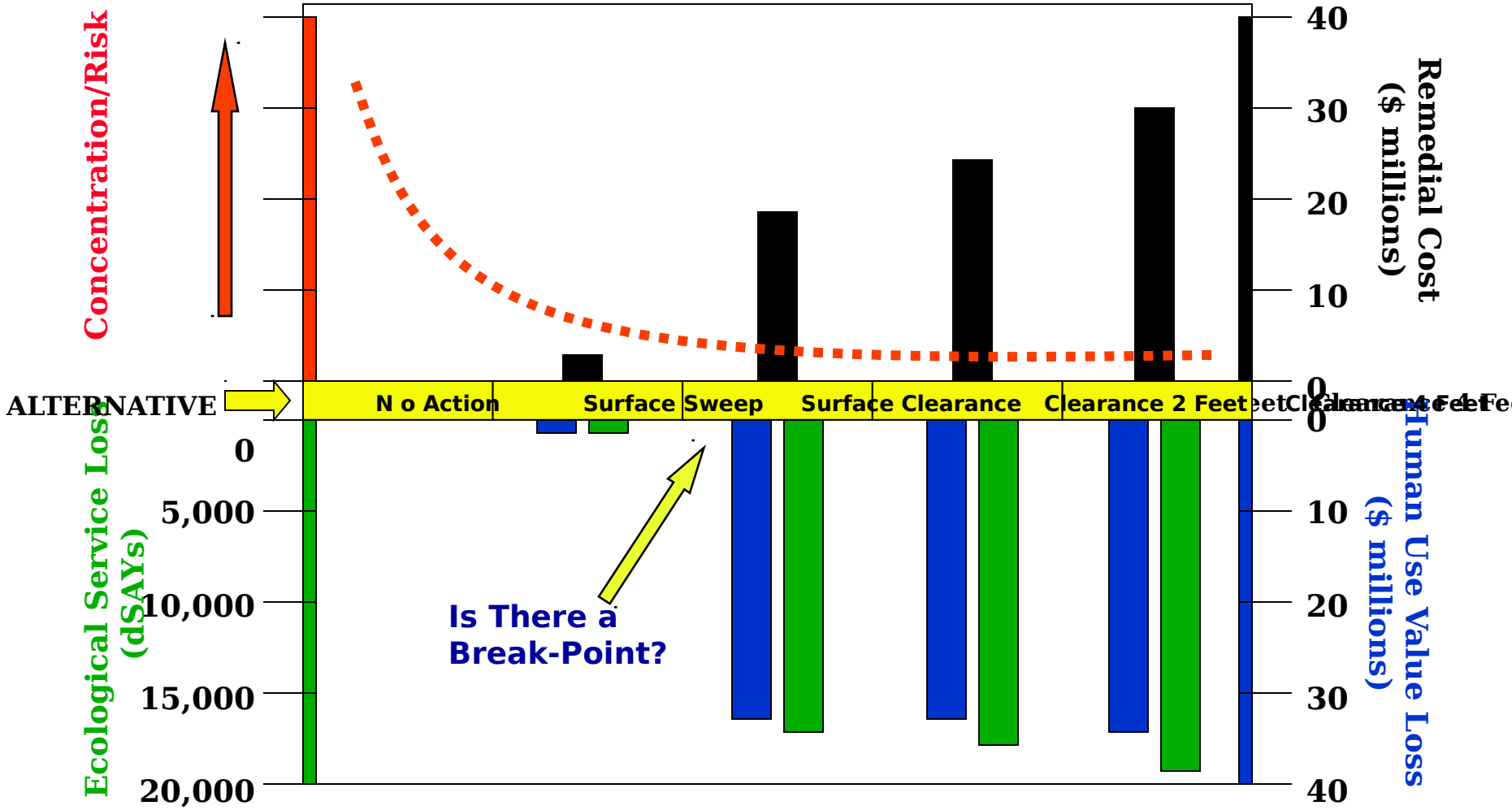
NEBA Results For BRAC Site 1: NEBA Results: Comparison of remedial costs and risk profile changes for each remedial alternative evaluated.



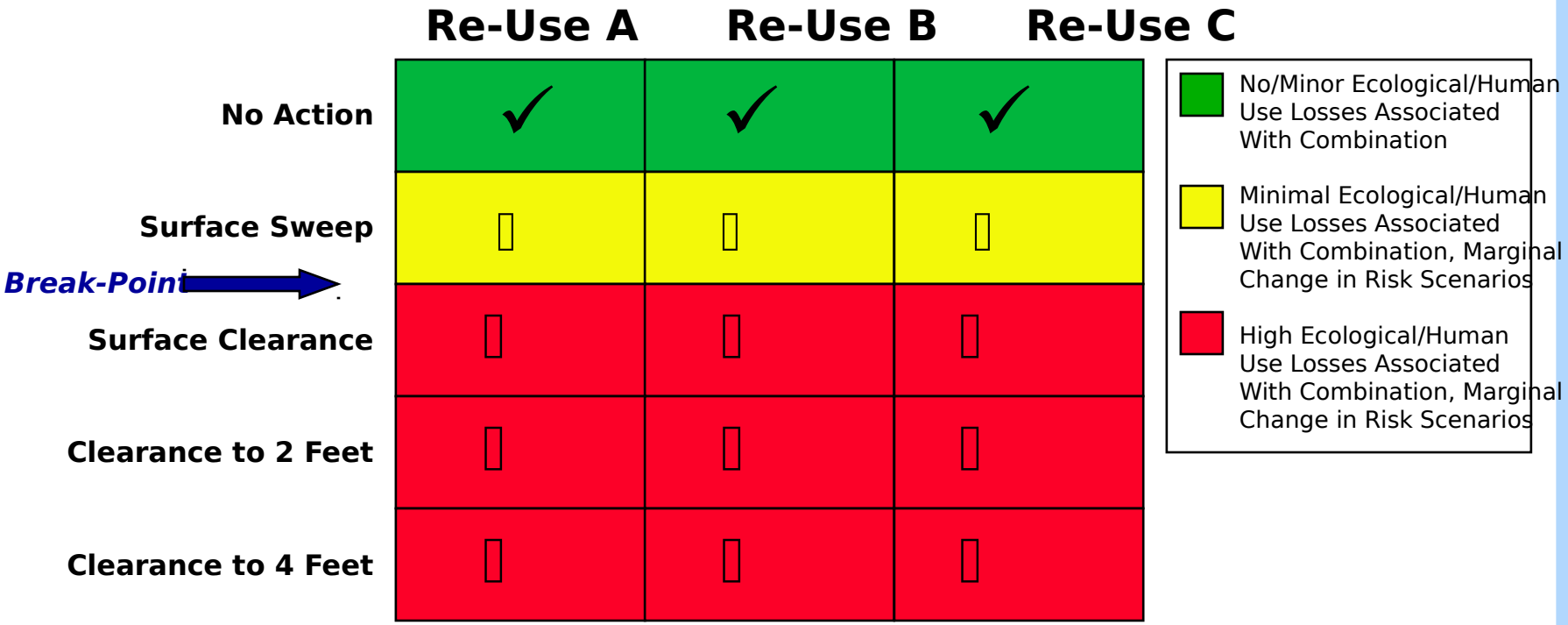
NEBA Results For BRAC Site 1: Comparison of remedial costs to risk profile, and ecological service changes for each remedial alternative evaluated.



NEBA Results For BRAC Site 1: Comparison of remedial costs to risk profile, ecological service and human use value changes for each remedial alternative evaluated.



Integrated Results for Combinations of Remedial Alternatives and Reuse Scenarios


Re-Use A
Re-Use B
Re-Use C
No Action
Surface Sweep
Break-Point
Surface Clearance
Clearance to 2 Feet
Clearance to 4 Feet
No/Minor Ecological/Human Use Losses Associated With Combination
Minimal Ecological/Human Use Losses Associated With Combination, Marginal Change in Risk Scenarios
High Ecological/Human Use Losses Associated With Combination, Marginal Change in Risk Scenarios

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Preliminary Conclusions

- **Some intrusive remediation alternatives might not want to be considered as viable options, they:**
  - **provide marginal incremental benefit towards human MEC exposure risk reduction.;**
  - **have substantial detrimental effects on both ecological and human use service values.; and**
  - **have costs that appear disproportionate to any incremental benefits in human and ecological exposure risk reduction (e.g., disproportionate cost analysis)**
- **Remedial decision-making should include a risk mgmt strategy considering both reuse and the impacts of potential remedial alternatives on natural resource service values.**

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NEBA and Value

- **Provides defensible basis for decisions; has a technical, scientific, and credible basis**
  - **Both DoD and regulators need to justify decisions**
- **Is not arbitrary, uses quantifiable metrics**
- ***Is unique in that it considers natural resource assets***
- **Integrates cost, risk *and assets***
  - **Allows for comparison of how identified remedial alternatives affect multiple parameters on an order of magnitude scale using common assumptions**

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Questions

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